one part in sixteen of absolute alcohol at 14°. No hydrate was obtained by evaporating its aqueous solution, but the same crystalline forms were deposited as from alcohol. With barium chloride it behaves similarly to the neutral salt, a partial precipitation taking place only with difficulty. It possesses much greater stability than the neutral salt, but like the latter it is reduced by sulphurous acid and stannous chloride, and oxidised by chlorine. Potash decomposes it with evolution of ammonia, but hydrochloric, nitric, or sulphuric acid has only a slight action upon it in the cold. Kept in a vacuum or in a current of air, it is appreciably volatile at ordinary temperatures. When heated strongly, a portion of it sublimes unchanged, part of it is converted into ammonium selenite, while the remainder is decomposed into ammonia, water, nitrogen, and a residue of fused selenium. In order to estimate the amount of ammonia precipitated by platinum chloride, 0·3140 gram was taken, which yielded 0·6234 gram of the double chloride, equivalent to 15·26 per cent. of ammonia, the amount thus precipitated being equal to 81·60 per cent. of the total amount of ammonia in the salt.

Relation of the Selenosamates to Sulphur Compounds.

It is stated that a compound is formed by the action of ammonia on sulphur dioxide, but the description of its properties shows that it does not correspond with the selenosamates. The latter bodies correspond more closely with the compounds which sulphur trioxide forms with ammonia. The molecule, SeO_2, therefore, in these reactions acts similarly to SO_3, rather than to what is usually regarded as its sulphur analogue, namely SO_2.

In conclusion, we are engaged at present in the production of other selenosamates, and hope to give an account of them at an early date.

VI. "On the Logarithmic Law of Atomic Weights." By G. Johnstone Stoney, M.A., D.Sc., F.R.S. Received April 16, 1888.

(Abstract.)

This memoir is divided into five sections.

Section 1.—When Newlands pointed out the dependence of the atomicity and other properties of some of the chemical elements upon the order in which their atomic weights succeed one another, and especially when this law was extended by Mendelejeff to all the elements, it became manifest that there exists a mathematical relation between a series of numbers and the successive atomic weights of the elements.

In the first section the reason is pointed out why the search for this law has been fruitless, at least as hitherto pursued by the author. The method he adopted was to plot down the atomic weights as ordinates of a diagram of which the abscissas represented some simple numerical series, and to endeavour to extract information from the resulting curves. In this method atomic weights are represented by lines, the ordinates of the figure. Now in the next section it will appear that, in that case, the curve is represented by the equation—

$$y = k \, . \, [\log (qx)]^3,$$

and is further complicated by x not representing simple integer numbers, but a circular function of them. The search, therefore, by this method was from the first hopeless, as the resulting curve is one which has not been studied by geometers, and of which accordingly the inquirer could not recognise the appearance when presented to him.

In Section 2 another method is pursued. The successive atomic weights, instead of being represented by lines, are represented by volumes. A succession of spheres are taken whose volumes are proportional to the atomic weights, and which may be called *the atomic spheres*. When the radii of these spheres are plotted down on a diagram as ordinates, and a series of integers as abscissas, the general form of the logarithmic curve

$$y = k \log (qx)$$

becomes apparent: and close scrutiny has shown that it expresses the real law of nature. It is the central curve that threads its way through the positions given by observation, and the deviations from it of the positions assigned by the actual atomic weights will be included by making x a circular function of integer numbers, instead of those numbers themselves. The first three terms of this function have been determined.

The issue of the investigation is to show that when such a diagram is formed with ordinates which are the cube roots of the atomic weights referred to hydrogen as unit, so that the ordinates may be the radii of spheres whose volumes represent the atomic weights—

1. The logarithmic curve—

$$y_m = k \, . \log (m\alpha),$$

(where $\log k = 0{\cdot}785$

and $\log \alpha = \bar{1}{\cdot}986$)

threads its way through the positions plotted down from the observations.

2. In the case of the perissads (the elements of uneven atomicity) the complete curve which includes their perturbations from the central curve is—

$$y_m = k \log \left[\alpha \left(m + \tfrac{1}{3} \sin \frac{m\pi}{27} + \tfrac{1}{3} \sin \frac{m\pi}{18} + \text{subsequent terms} \right) \right],$$

the next term being probably either—

$$- \tfrac{1}{2} \sin \frac{m\pi}{9}, \qquad \text{or } - \tfrac{2}{3} \sin \frac{m\pi}{9}.$$

3. The form of the function representing the perturbations of the artiads is different, at all events after the third term.

Section 3.—There are other neighbouring logarithmic curves which pursue a course close to the observed positions, and in Section 3 the method adopted in dealing with these curves is described, and the grounds on which they have been successively excluded are stated. The evidence relied on has been, for the most part, that the perturbations from them are less reducible to order.

In Section 4 the curve finally selected is thrown into a polar form, and furnishes a diagram of singular convenience for laboratory use. It presents conspicuously the information which a Newlands and Mendelejeff's table is capable of supplying, with the further advantage of also placing before the eye an intelligible representation of the atomic weights.

The last section contains some observations suggested by the investigation.

Presents, April 19, 1888.

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